THE HARMONIOUS WHEATSMITH

Dedicated To Dad

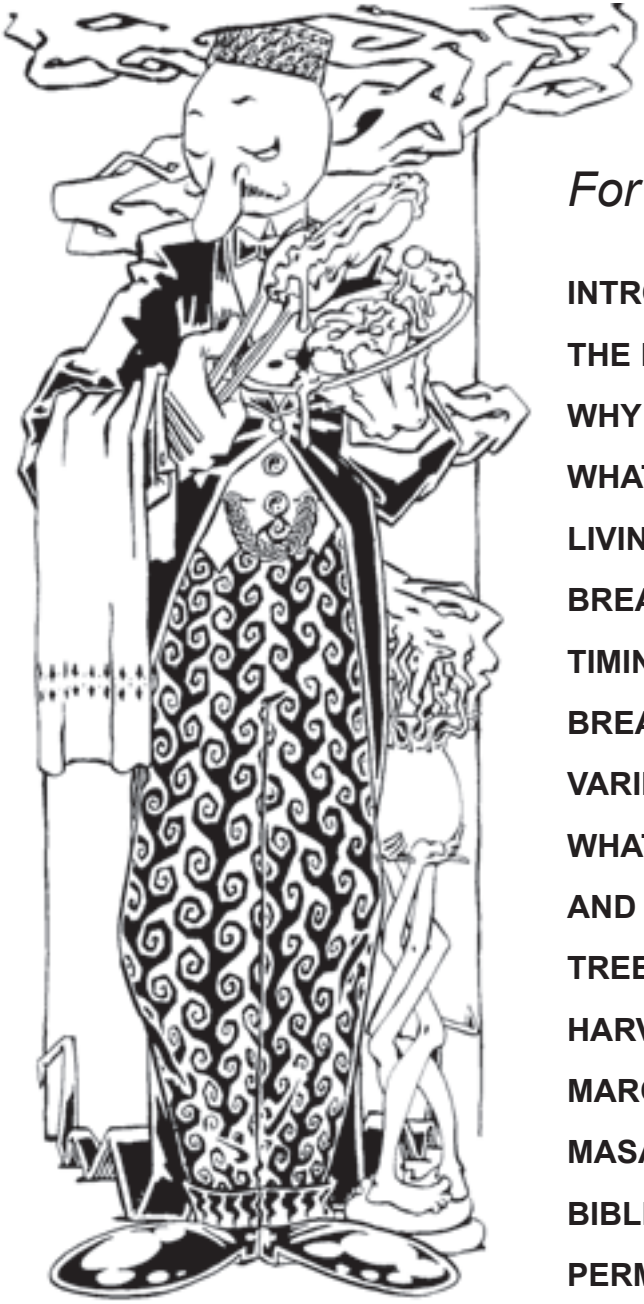
The Harmonious Wheatsmith ISBN 0-9517890-0-7

Published by Mark Moodie

Oaklands Park, Newnham-on-Severn, Gloucestershire, GL14 1EF
www.moodie.biz

Contributors	£2
Bonfils Research Fund	£1
Carbon tax	not for eBook

Illustrations
© Lucian



For your pleasure ...

INTRODUCTION	4
THE METHOD	5
WHY CHANGE?	6
WHAT GRAIN NEEDS	10
LIVING SOIL	13
BREATHING IN	14
TIMING	16
BREATHING OUT	18
VARIETIES	21
WHAT TO AVOID...	24
AND WHAT TO SEEK...	25
TREES	26
HARVEST FESTIVAL	27
MARC BONFILS	28
MASANOBU FUKUOKA	29
BIBLIOGRAPHY +	20
PERMACULTURE	31

INTRODUCTION

AT the centre of modern life lies a paradox; we must eat to survive but the way we produce our food means that survival will be denied us unless we change. The world is turning into a wasteland. The rate at which this is happening and the threat poses to all life is so stupifying this it is almost impossible to find room in ones mind to contemplate the horror which will result form the continued loss of fertile land for agriculture and forestry.

Who can believe it?

No one know better than the farmer the financial and moral dilemmas at the grass-roots of this tragedy, but each of us has access to the information and can imagine the consequences if the challenge of change is not embraced. Our land could be increasingly vital, a capital asset to pass on richer than we found it, but we wear our the soil as we wear out ourselves.

It's easier to criticise and blame but it only serves to annoy unless we are prepared to take the wheel or give support with clear suggestion for a new direction.

Permaculture is a collection of observations and techniques gathered together with the aim of feeding ourselves whilst repairing the soils that have fed us for so long. It hopes to encourage and design self-sustaining communities of people plants and animals living on healthy soils. This booklet concentrates on growing cereals with these aims in mind. In particular it looks at winter wheat but is readily adaptable to other cereals. It describes the Marc Bonfils Method, a high-yielding system which enhances the soil whilst producing a quality grain.

It grew from the vision of Marc Bonfils who is determined to turn the destructive tide of our chemical agriculture and who founded a way to grow food without ploughing for the European climate as Masanobu Fukuoka has for Japan's.

This is an invitation for you to play a part in the big changes our times demand and join in the trials of this method on your land. It takes years of patient work to nurture good consistent crops but lasting change starts slowly an steadily. Good fortune to us all.

THE METHOD

MARC Bonfils devised this method and applied it with great success in le Beauce, France. It is regulated by the summer and winter solstices.

At the summer solstice wheat is put on the soil surface at a spacing of 60 cm into a carpet of spreading perennial clover. This gives sufficient growing time for wheat to develop a prolific deep root system before facing the winter. The intense assimilation of elements needed for the healthy crop have been favoured by the seasonal activity of the soil bacteria. Sodium, potassium, magnesium, and phosphorus with trace elements have been drawn from the living soil into the structure of the plant whilst there have been particularly intense photosynthesis storing carbon during the summer and autumn. The wheat plants rest as the cold season comes with the approaching winter solstice.

The plant stands ready at the onset of spring to flower and draw upon these stores to offer up heavy yields later in the summer.

If plants grow 60 cm apart in each direction there are crucial benefits. The energy of the growing wheat is not wasted competing with neighbours. When applying the method to short cycle cereals like spring oats or millet a shorter distance is sufficient (minimum of 30 cm). New sowings are again made a mid-summer straight into the standing wheat as it matures.

The harvest is at the usual time. When threshed the straw and chaff are returned to the field in an even mulch to be recycled by the living soil.

Yields of 800 Kg per 5 ares or over 6 tons per acre have been achieved by this method after the soil has found its health and fertility. The system works because it uses the maximum potential for soil enrichment by natural means. Mineral uptake is made possible by the activities of micro-organisms, earthworms and mycorrhiza in the earth. It is this combination of early, widely spread surface sowing in undisturbed soil with its permanent living cover of rampant leguminous plants and appropriate trees which makes the optimum conditions for healthy soil and crops. Don’t start yet - read on.

WHY CHANGE?

IN these islands there is a standard pattern for growing wheat. The field is ploughed, unless harvesting the previous root crop makes this unnecessary. Lumps may be left as protection from the wind for the seedlings but usually the field is harrowed to a give a fine crumbly surface. the dressed (coated) seed is sown or drilled into this an inch or two apart in rows every eight inches apart all over the filed. The tractor leaves' tram lines' where its wheels will roll in all future operations. WInter wheat is planted from September to November to grow a little before the dormant period in winter. It may receive a quick grazing in the new year. In spring it has a head start as its roots are developed by the time the spring wheat is sown. This can give higher yields and sometimes an earlier harvest but is vulnerable to moulds and mildews in the cold wet weather.

By the time of harvest the crop will have required the tractor to have thundered up and down ploughing, harrowing and sowing, applying fertilisers, herbicides, fungicides and hormone regulators. Few of these are without problems as the media remind us daily. But what's the alternative? It would be ideal to have the fertility inherent in the soil, to have no weeds, and it would be delightful if we didn't have to plough. But we must plough and harrow to give the seedlings a chance against the weeds, and then a feed to help the crop grow. But since weeds grow too and we need to remove that competition, and the grain will need feeding again. We've got acres to harvest so we need a machine and that requires ears at the same height for the blades which demands careful breeding. There has to be detailed research into resistant strains to stay ahead of the diseases, the mildews and the pests.

The end result hits our *breakfast table* as the bread we eat and the cereals we coat with denatured milk. That food requires huge industries mining and transporting, others researching to find the remaining grace in the accelerating tornado of interference. Certainly there's employment and profit but there's pollution, disease, wars of vested interest, and the creeping deserts.

LUCIAN .. .
07 1990

One can only respect the conventional way that seemed such a gift from the heavens and that has fed us all for so long. But it must be acknowledged as an experiment that has failed and threatens to take us with it.

The problems of chemical agriculture are now widely recognised. The thriving and laudable organic and Bio-dynamic movements are heartening indicators of interest and action in saner alternatives. The organic farmers see that fertilisers from a living source are infinitely preferable to those soluble mineral fertilisers of conventional neighbours. Biodynamic farmers further realise the need to stablise the muck in heaps enhanced by their preparations, and try to keep the fertility increasing within the farm organism. Yet, on the whole, both take their leads from the practices of agribusiness farms; the work is dominated by ploughing with tractors, This is very hard to avoid and I'm reluctant to criticise farmers who gives a lot of hope and inspiration. But it is my hope that this booklet might help those who realise that the greatest asset of a farmer is the structure, fertility and health of the soil on the farm.

Ploughing and compaction are practices that retard the process of revitalising the soil. In a living topsoil most of the volume is air. It is not a suffocating midnight for the organisms within. Zarathustra recommended ploughing at the dawn of agriculture only to bring light into the soil. Ploughing as practised today is not doing this in the best way; in order to create a secure and compact base for a new road the soil structure is first disturbed and the n rolled on by heavy machines. This is what ploughing can achieved in one pass. The roots of plants are the best bringers of light one could wish for. The spongey structure is maintained and enhanced by the micro organisms that thrive in unpoisoned soils. Earthworms in particular create tunnels whilst bringing the other essential ingredient of healthy soil - humus.

Humus is a colloid which means it has a special suspension of nutrients within. If you take a colloid, like jelly, and pour water over it nutrients don't leach out. It is a special state in which living elements are stored in living soil. This is available to plant roots but cannot be leached out by rain. Clean water an exist side by side with humus. If soluble elements of artificial or organic origin are poured in the earth a solution of these will be formed which is completely different thing. These nutrients

wash out quickly with the rains to pollute the water table, or may be taken up by the plants in the search for clean water for their transpiration. this gives big bulky plants which are intoxicated on unsuitable and unorganised matter. We then take in these plants. We might as well drink the solution ourselves. It's little wonder that the stressed plants is susceptible to *every opportune disease.*

This is why there's so much emphasis put on stabilising the nutrients by

composting. The compost heap is a vibrant pile of stabilised nutrients in the form that plants like; humus. You can overdose a plant with chicken manure or with chemical fertilisers; they will hardly know the difference. To be good for the earth it needs to be stable.

Ploughing turns over this top layer of humus, burying it or exposing it to the sun. These are the best ways to destroy it. Many good farmers see no way around the alternation of creating and destroying humus. It is what's done when a fallow period is turned in so that the fertility built up can be cashed in with the succeeding crop. When the humus is destroyed the nutrients are available to escape from the hungry seedlings to the air or water table.

Is it possible to get successive crops of grain without ploughing, weeding, using chemicals or using separately made compost? Can it stay healthy, improve the soil and give good yields?

This is what the method claims. It has worked so it can work. We would like you to join in trying to make it work here in our temperate island climate.

WHAT GRAIN NEEDS

WHEAT is more resistant than rye to damp conditions, although suffocation of the plant through damp can occur at the rising stage. Excessive moisture inhibits rooting, while very sunny weather encourages it. Wheat is relatively tolerant of soils which are only moderately rich, and of fairly low pH (5.5 and above.)

RYE is very susceptible to root asphyxia and to inundation but is tolerant of soils which are of low pH (optimum 5.5) and can be cultivated in soils below pH 5. Its very great vigour enables it to use very sandy soils, and its powerful roots can explore the mother rock to dissolve fertilizing elements at depth. Particularly strong and rapid tillering make it very *competitive with weeds.*

OATS tolerate poor acid soils but are susceptible to cold, though early sowing and a cover crop increase its resistance. It is essentially a moisture loving crop, mainly grown in mild damp climates such as are found in Brittany, Ireland and Scotland.

BARLEY is fairly sensitive to low pH (optimum about 5.5) and is unsuited to acid soils. It is very resistant to drought, preferring limey and relatively poor soils.

Adding these broad guidelines to close observation of your own soil and climate should enable you to choose the right cereal for the individual circumstances.

CARBON STARVATION

To raise shoots above the ground wheat requires 100-150'C T-sum (cumulative daily max. and min. temperature divided by two). The closer to winter it is sown the slower and more precarious will be this crucial phase. The optimum temperature for germination lies between 20 - 25˚C, although it can occur from 1 - 35˚C. We can expect wheat planted in August to rise within four days, dropping to seven days in September and a month for November sowings.

The optimum temperature for producing sideshoots (called 'tillering') is also 20 - 25˚C; summer temperatures rather than December - January. Prior to tillering the seedling has least resistance to cold since the vegetable tissues have not hardened sufficiently.

Considering the plant physiology of winter cereals (germination, photosynthesis, and tillering all preferring the warmth), and the natural wealth of nitrogen available in the summer, the consequences of October and November sowings can be appreciated. Short days (10 hours of light failing rapidly), poor light and solar intensity, and the moderately low or low temperatures lead to undesirable consequences:

1. Foliar elongation; the whole plant is forced to compensate for the lack of light.
2. Expenditure of energy on leaves at the expense of the roots which favour:
   a) enfeeblement of the plant to the detriment of the strength of the supporting tissues.
   b) lack of resistance to disease and cold.
   c) slowing down of the metabolism due to the longer sap canals.
3. Wasting of the fertilizing elements of the soil, with nitrogen being washed out by the autumn rains or taken up by the weeds.

4. The accumulated amino acids causing intoxication that provides a favourable terrain for diseases and pest.

The result of these four factors is poor photosynthesis. Thus we have carbon starvation. Thanks to early sowing the cereal employs to maximum advantage the long days (16 hours plus), and strong solar intensity for maximum photosynthesis. This, in turn, encourages the development of a robust root system. The plant balances the available carbon and nitrogen and since there is no carbon starvation the available nitrogen is recovered and stored in the roots of the thriving plants.

LIVING SOIL

PERENNIAL clover reinforced with a mulch of straw that is returned to the surface harbours a soil which is vibrant with life. About 1 tonne/hectare of earthworms come to the surface and dive with bits of detritus that they turn into humus. The abundant roots of early planted winter wheat draws on a bacterial mass valued at around 6 tonnes per hectare. Cautious estimates would set bacterial lifespan at about one month giving annual deceased bacteria of around 80 tonnes/hectare. Combined with the azotobacters living with the algal layer, the decaying organic matter and the high levels of minerals inherent in the system we find the basis of the high yield.

This life makes available a reliable supply of minerals at a level suited to the rhythmical needs of the plant's physiology. Compare this with the inappropriate doses of unstabilized nutrients which kill the microorganisms and mycorrhiza which mediate between the humus and the plant. The sad state of our water supplies add to the legacy of such methods.

With deep rooting plants the soil is opened up, each root benefiting from the decomposing remains of the crop before it leaving an easy path *full of nutrients* for the growing tip.

The crop is buffered from the seasonal variations in rainfall and temperature by the steadily increasing reserve of moisture and minerals in the humus. The mulch and biologically active topsoil reduce leaching to a negligible level and soil erosion is eliminated, benefiting the crop and the whole environment. The farmer has increased capital in the very structure of the soil.

Although crops are stabilised by the higher resistance to drought and temperature variations there can be a slight reduction in growth in damp periods as the soil is less subject to warming by the sun. This need not worry us since the plants are unforced and the masters of their most appropriate growth. They will find the best foundation for a crop in the conditions presented to them.

BREATHING IN

THE system makes use of both the cereals' needs and the soil life. The wheat grain is placed on to the surface of the soil. This produces a short or non-existent underground stem, the favoured site for bacterial attack. Access to light with the abundant moisture and warmth provide the perfect conditions for germination in contrast to the practice of burying the seed. *Just press* the seed into contact with the soil and it will be protected by the clover from animals.

By early August wheat has seven leaves. An exponential surge of growth begins. Nitrogen is most available (20 times more than in March), the roots accumulate reserves and tillering commences. The production of tillers thrives on nitrogen balanced with carbon from photosynthesis, each tiller giving one ear, thus forming the backbone of the yield. All this is sluggish for seed sown in the cold months.

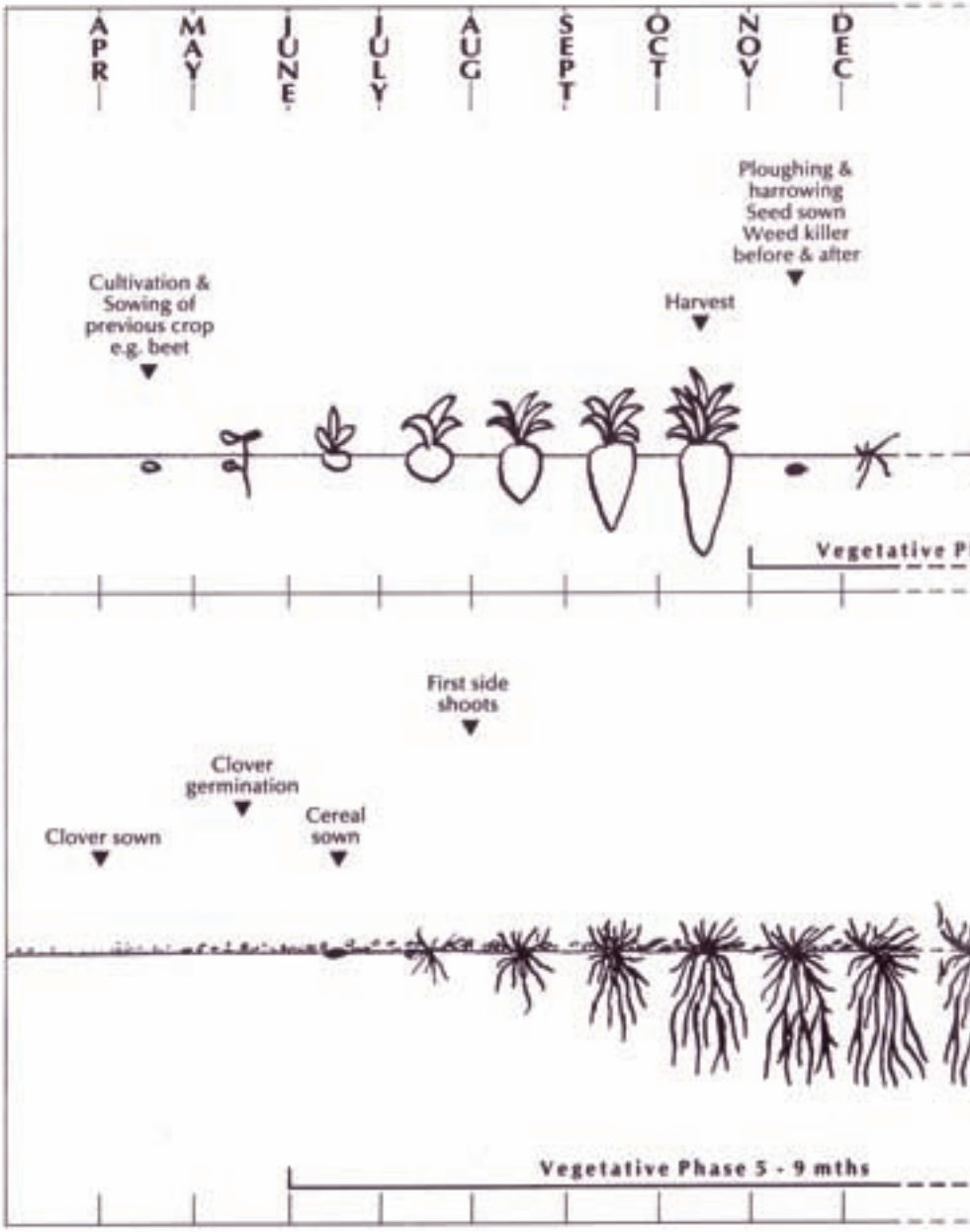
Between the rising wheat and the clover sea a greater degree of the sun's energy is trapped than with either plant alone.

The plant uses water and the photosynthesized carbon to build starch, the basic material of cellulose with which it increases its size. Thanks to the excellent exposure of its leaves (plants are 60cm apart) and the time that is available (early sowing) it can unfold as many as 25 leaves before winter enabling intense photosynthesis to occur.

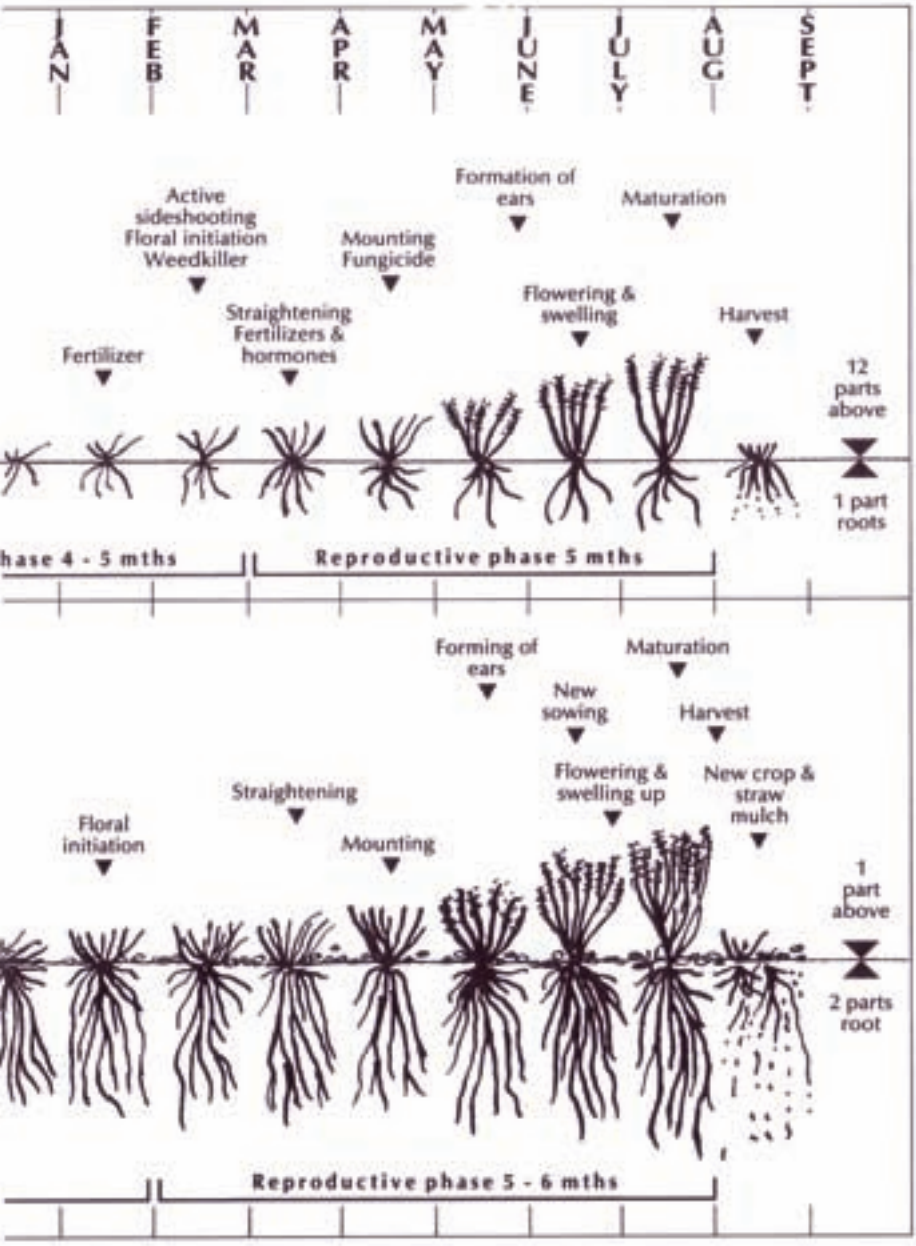
Close planting means competition for the available light so energy is diverted to develop leaves at the expense of tillering and root formation. Winners and losers suffer degrees of carbon starvation which forces the plants.

The varieties used and the early sowing encourage very vigorous matted roots which have space to spread out. These can make ideal use of the decaying organic matter, water and minerals making up the complete requirements for metabolism in the vegetative phase. The roots penetrate the channels left by the decaying roots of the previous crop and feed on the detritus of these and the bacterial corpses around them. Between the solstices the wheat has created a rich store and a firm foundation. It has been a process of assimilation of energy rich starch and albumin for building. The metabolism of the wheat slows down with the cooler days leaving the plants *replete and sleeping* through the depths of the winter, strong enough to bear the hardening effects of cold and to support the new growth of spring.

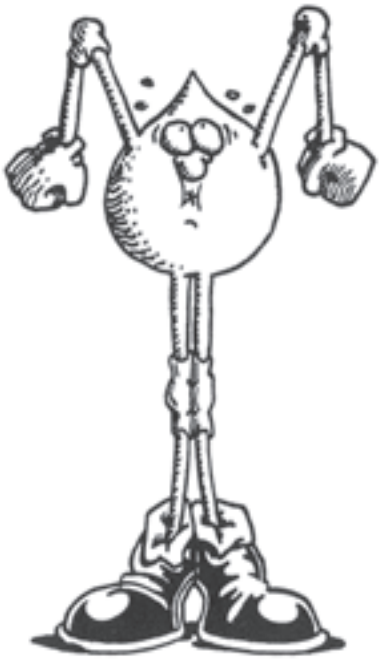
COMPARATIV


APR
MAY
JUNE
JULY
AUG
SEPT
OCT
NOV
DEC
Ploughing & harrowing Seed sown Weed killer before & after
Cultivation & Sowing of previous crop e.g. beet
Harvest
Vegetative P
First side shoots
Clover germination
Clover sown
Cereal sown
Vegetative Phase 5 - 9 mths

E TIMING


JAN
FEB
MAR
APR
MAY
JUNE
JULY
AUG
SEPT
Active sideshooting Floral initiation Weedkiller
Mounting Fungicide
Formation of ears
Maturation
Straightening Fertilizers & hormones
Flowering & swelling
Harvest
Fertilizer
12 parts above
1 part roots
hase 4 - 5 mths
Reproductive phase 5 mths
Forming of ears
Maturation
New sowing
Harvest
Flowering & swelling up
New crop & straw mulch
Straightening
Floral initiation
Mounting
1 part above
2 parts root
Reproductive phase 5 - 6 mths

BREATHING OUT



AS winter passes and the days lengthen the wheat draws on its reserves from the summer and autumn. This occurs because the cold soil offers insufficient activity of the biota (bacteria and micro-organisms) to nourish the plants. It is the strength built up through early planting which powers the early flowering and high yield of the wheat.

Yield is a function of several variable factors;

- number of plants per unit area
- number of ears per plant
- number of earlets per ear
- number of grains per earlet
- weight of each grain

In the process of 'breathing out' all these factors are satisfied with rewarding ease. The lengthening days bring more tillering, and floral initiation, the beginning of the reproductive phase. In February-March, having days of 11 - 12 hours, the apex of the master shoot measures 0.5mm long. 15 - 40 days later the nascent ear is 1 cm and the apex has reached 1.5 mm. The stamens lengthen and the ovaries develop until fertilisation.

(Wheat is self-pollinating except in very hot summers.) At this time the weight of the ovaries determines the final weight of the grain. The fertilised seed begins to form the enveloping sheaths. Once formed the seed accumulates starch and other related substances from the soil and other parts of the plants via the sap. This is sometimes known as the 'water landing', the weight of water remaining constant for a fortnight as dry matter accumulates and, eventually, replaces the bulk of the water.

Appropriate nourishment is essential during mounting (the phase from mid-winter until fertilisation) for the greatest number of earlets to form without aborting the ovaries. Each earlet has a potential for 9 flowers but it is rare for more than 5 to reach maturity.

Every stress factor - lack of light, fratricidal struggle, inappropriate fertiliser levels, excess heat, threatens the process and the final yield.

Widely sown wheat means the light is shared, the minerals are available from the roots and steadily awakening soil in doses suited to its physiology, and the mulch and clover buffer variations in heat and moisture.

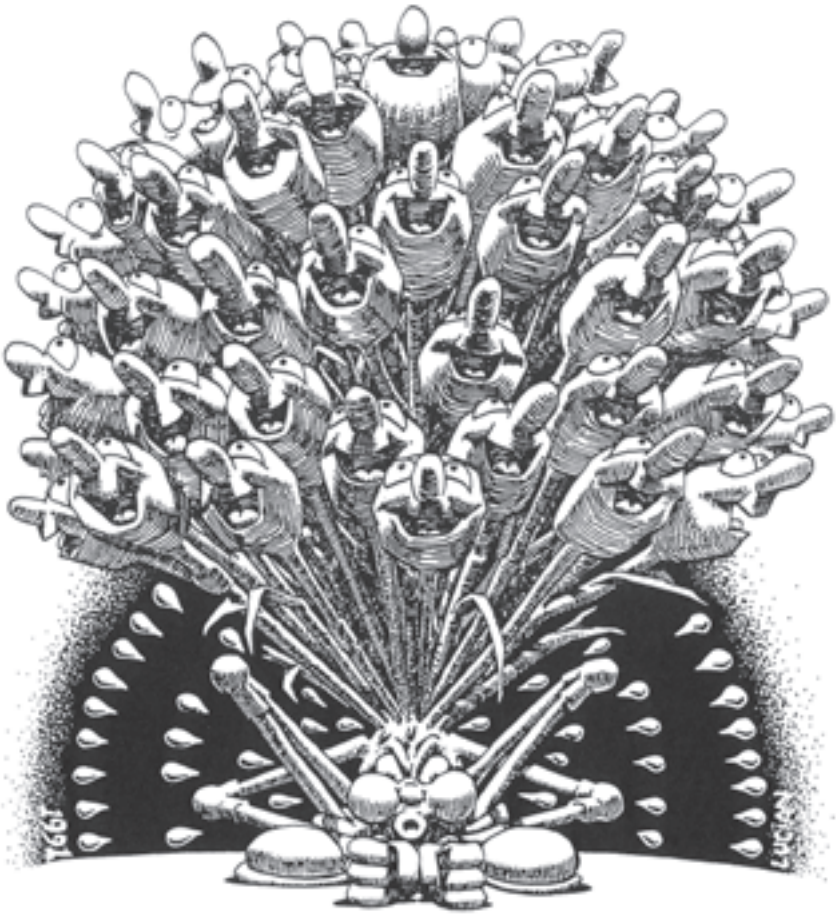
Other problems can arise at this time. Excessive evapo-transpiration can divert water, bypassing parts of the plant that need it; the vascular pump becomes unprimed. This can fix the grain size if it occurs during formation of the layers of the fertilised seed. If it happens during 'water landing', assimilation of dry matter is impaired resulting in crinkled grain. Deep roots make all these problems less likely to occur.

Open sowing reduces the energy used in growing long straw and avoids withering through lack of light. It is therefore, more resistant to lodging and the diseases of spring.

The new seed is pressed in through the clover carpet amongst the maturing 'bushes' of wheat which is itself not harvested until it is ripe in the summer. The crop is threshed and only the grain leaves the field, everything else being spread over the field of new plants and clover.

Overleaf are comparisons drawn from experiments done by Marc Bonfils in le Beauce using winter wheat. They are tabulated with a set of figures taken as an approximate average for wheat grown in the conventional manner.

METHOD	CONVENTIONAL	BONFILS
plants/m	350	1.5 - 4
ears/plant	0 - 3	100 - 150
earlets/plants	12 - 15	35
grains/ear	20 - 30	40 - 60
weight of grains	Low	High



VARIETIES

THE ideal spreading leguminous plant is a local perennial white clover. Marc Bonfils has recommended a French variety 'lupuline' for dry climates sown at 5kg per hectare. Care must be taken to get a variety that does in fact fix nitrogen. Many of the commercial clovers are grown in the U.S.A. or N.Z. Our soils don't necessarily have the appropriate bacteria. This can be inoculated into the seed when it is first introduced. If a local variety cannot be found then the one in the catalogues will have to do.

In conventional practice cleared land is harrowed to a fine tilth for the tiny seeds. After sowing the land is given a light rolling. Clover likes a soil that has good levels of phosphorous and potassium, and has a pH of around 6.5 for most varieties. In pasture land clovers increase in closely grazed fields and in those parts of the field that aren't dosed with soluble nitrogen. Sow the seed in spring, summer and autumn to establish the sward.

Clovers conserve moisture by being a living mulch and in association with the warm seasons play host to bacteria in the upper layers of the soil, The moist and warm micro-climate shaded by the plants encourages algae known as azotobacter which are associated with legumes. These can fix up to 200kg/hectare of nitrogen in addition to the 5 - 600 fixed by the clover.

The choice of cereal variety is critical. It must be strictly a winter variety. Hybrid varieties, a mixture of winter and spring or warm climate types, will go to grain before the winter producing less than under standard methods. A true winter variety needs the cold of winter to go to seed.

Most *modern varieties* have hereditary characteristics which risk them going to seed in the year of sowing. They should not, therefore, be sown before the summer solstice. True winter wheats may be sown from May to take advantage of the soil humidity in regions prone to drought. Wider spacing is then required. Depending on the T-sum and local rain patterns sowings can take place up to two months before the first frost at a minimum spacing of 50cm.

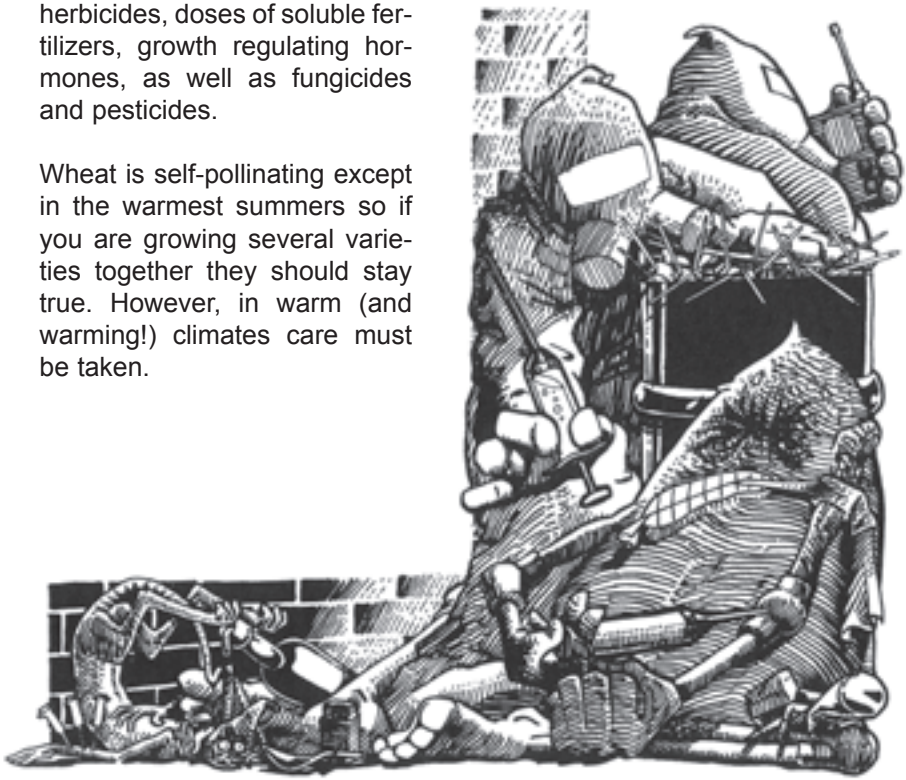
All wheat varieties in the current seed catalogues have a common ancestor called Noah (Noe?) bred in Russia in 1826. It's forebears from north Africa crossbred with a spring variety suited to the Mediterranean regions. This means a common set of characteristics; short straw, spring development, and sensitivity to cold, root exposure, and rust. This crossbreeding was essentially to compensate for late sowing after a root crop, and to be suitable for mechanisation. But it is at the expense of the vigour of the

roots, the capacity for tillers, and competitivity with weeds. Contrary to popular belief, wheat has great resistance to weeds. Wheat is one of the most vigorous crops we have.

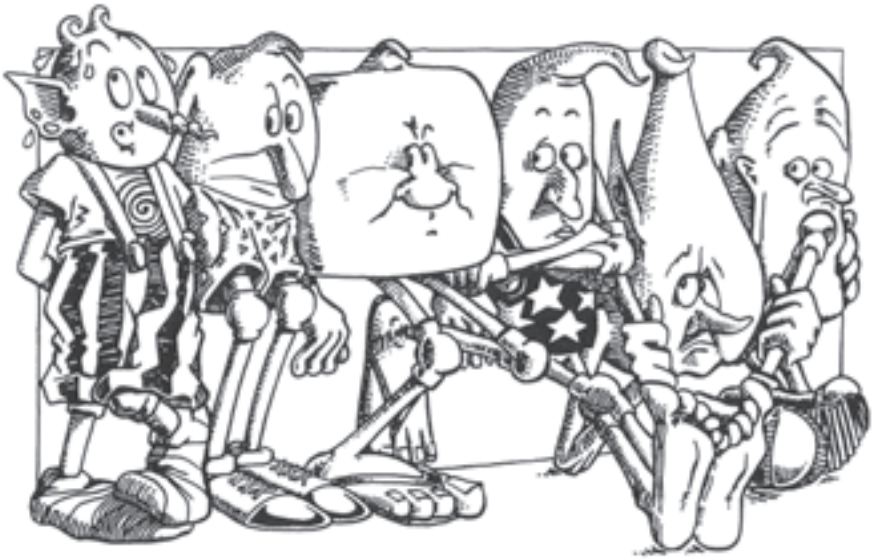
Its index of competitivity outstrips other grasses and crucifers, particularly if sown early. It has, therefore, no worse enemy than itself, particularly after mounting occurs and there is little chance for other plants to colonize the soil once the system is established.

Modern varieties have become *dependent on chemicals* to compensate for the loss of these characteristics requiring the application of pre and post germination herbicides, doses of soluble fertilizers, growth regulating hormones, as well as fungicides and pesticides.

Wheat is self-pollinating except in the warmest summers so if you are growing several varieties together they should stay true. However, in warm (and warming!) climates care must be taken.



WHAT TO AVOID ...



- exotic modern varieties
- short straw
- poor vegetative vigour
- restricted area of side-shooting
- poor resistance to cold
- earliness (alternative or semi-alternative types)
- floral initiation occurring at 400' C T-sum
- small leaf area to limit evapo-transpiration and the risk of drying out of the immature grain, which has the following con sequences:
    - carbon starvation
    - large fertiliser requirement
    - poor resistance to drying out whereas the forebears were drought resistant
- 12 parts above ground, 1 part below

... WHAT TO SEEK

- varieties pre-dating 1826
- long straw
- strong vegetative vigour
- broad area of side-shooting
- high resistance to cold
- very late maturity
- pure winter type
- floral initiation requiring at least 6-700° T-Sum
- large leaf area for:
    - better photosynthesis
    - absence of carbon starvation
    - highly developed roots to avoid drying of immature grain
    - 1 part above ground, 2 parts below

Such varieties are; Blé Siegle (or Bled Siegle or Ralet); Autumn Victoria (Victoria d'Automne); Prince Albert; Autumn Chiddam; Golden Top; Dattel; Sherrif Squarehead; Poulard d'Auvergne; The Giant Squareheaded Hybrid Wheat (tritical 1907); Schlanstedt Rye.

Trials have also begun with Dinkel; Champlein; Red Standard; Chidham Red and White Chaff (related to Chiddam?); Squarehead Master; Percival's Blue Cone; and Maris Wigeon.

Oats being tried include; Radnorshire Sprig; Land Oat; Ceirch du Bach; Cornish; Old Cornish; and Hen Gardie.

TREES

THE agricultural landscape is enhanced by the addition of trees. They are not only an essential aesthetic part of the countryside but a vital aspect of the productive capacity of the land. Trees use their deep roots to penetrate and dissolve the mother rock in the subsoil, drawing precious minerals and trace elements to the topsoil. Leaf fall becomes the means of distribution of this bounty. Tree roots inhibit the effects of leaching and stabilise the movement of water in the immediate surroundings. A landscape stripped of trees is well on its way to becoming a wasteland having no capacity to buffer drought and heavy rains. Soil erosion is inevitable once the balance of the elements is so grossly upset.

Leguminous trees have a special role in this system. If placed 15-20 metres apart there is little detriment due to loss of sunlight. Wheat will readily grow at their feet encouraging you to take time after a meal to go there quietly to digest and enjoy the surroundings in thankfulness and peace.

HARVEST FESTIVAL

IN the media the excitement over 'mad cow' disease has eclipsed the interest in salmonella in poultry, leaving the steadier, deeper crisis to the small print. Farmers incomes are down again, people continue to leave employment on the land, suicides amongst farmers are higher than any other trade, Scottish snow ploughs spent the spring clearing roads of top soil whilst hedges are still eradicated like so many irrelevancies in the way of progress. The list goes on. Agriculture is in the throes of crisis

Fortunately there's an increasing body of work that has dared to look at the crisis and spotted the opportunity within. In scanning the horizon for encouragement Masanobu Fukuoka and Marc Bonfils stand tall. Both have studied the conventional wisdom and moved on with the courage of their convictions. They have demonstrated the success of blending study, application and observation with commitment and perhaps this is just as valuable as the recipes they have produced for growing grain. A method as unorthodox as this is bound to need much thought and loving attention. The best fertiliser, after all, is *the farmer's boots*.

With love and respect for the gifts with which we were born together with the qualities they have demonstrated there is hope that we can create somewhere beautiful for our children. We can avoid the responsibility, drag our heels at the enormity of the chore awaiting us, or we can co-operate and support each other in taking on the incredible challenge. I hope enough of us can rise to the demands of these troubled times, and may this booklet have its place in the turning of the tide.

MARC BONFILS

MARC Bonfils' cereal work represents years of intense research during which time he earned his living cleaning in factories, taking little sleep, and saving everything he could to work towards the method in this booklet. It has had its toll on his health but it indicates the urgency of his search for a way to grow cereals without destroying the soil. He worked from home and in the field in le Beauce which is the French wheat belt. He hitched with the harvest from there, between le Mans and Tours, back to Paris.

The conclusions he reached and the success he has achieved are the results of many hours of theoretical and practical work, and demonstrate his profound understanding concerning the physiology of all the cereals, legumes, and soils.

The method is truly compatible with the style pioneered by Masanobu Fukuoka, which has been translated, 'do nothing' farming. However, Marc is concerned that this does not attract ungrounded trials. Nothing can blunt enthusiasm for something new and radical so much as those who do not follow the guidance and proclaim 'failure'.

Anyone who will give their time and awareness to further research through their own trials can participate in the seedbank of winter cereals organised through Permaculture Pyrenées. They would be grateful for your results and observations, together with photographs if possible.

It is a shame that original research of such qual,ity and urgency is unfunded either by governments or green organisations. Some members of the British Permaculture Association are seeking sources of finance to ensure that Marc's further research is better funded and will be pleased to receive suggestions. Any surplus from this booklet will go to Marc for this purpose.

Marc's current research concerns bee-keeping. Publications on this and other aspects of his work are available in French from Permaculture Pyrenées. We hope to have them in translation in due course.

MASANOBU FUKUOKA

THIS work would be incomplete without acknowledging our debt to Masanobu Fukuoka, the pioneer of natural farming. This philosophy has shown by its impact on the environment and by its yields that its adoption over the methodology of conventional agribusiness is justified and requires our attention.

His life, philosophy, and work is beautifully documented in the book, 'One Straw Revolution', and 'The Natural Way of Farming' gives a more technical account.

While still young and working as a food scientist in Japan he had a flash of inspiration, rejected his position and its methods, and returned to his village. Since then he has experimented with natural farming which has four principles;

no cultivation
no composting
no weeding
no pesticides

Soil fertility is assured by taking care of the soil organisms in the top soil. He uses compatible species which grow side by side (concurrent association) rather than in rotation. He returns all organic matter to the soil surface to be transformed into humus by the living soil which is never inverted. He maintains that making compost is artificial and wasteful.

All this finds its own justification in the crops, and the land which has given record returns for over twenty years. Marc Bonfils' trials were in the ground before he heard of Masanobu Fukuoka but in recognition of the similar approach the method described here has been called the 'Fukuoka-Bonfils Method'.

BIBLIOGRAPHY +

WINTER WHEAT AND ITS PLANT PHYSIOLOGY ACCORDING TO THE FUKUOKA-BONFILS METHOD. Damien Tabbard

NATURAL AGRICULTURE: WINTER WHEAT IN NORTHERN EUROPE ACCORDiNG TO THE FUKUOKA-BONFILS METHOD. Eric van Essche

Two reports from students of Marc Bonfils that form the backbone of this booklet. Many thanks to you both.

THE ONE-STRAW REVOLUTION and THE NATURAL WAY OF FARMING.
Two great works by Masanobu Fukuoka. The first is inspiring and the second provides academic ballast.

BIO-DYNAMIC AGRICULTURE: INTRODUCTORY LECTURES VOLUMES 1 & 11
Alex Podolinsky's books are excellent on humus and if you're interested in this fascinating way of farming it's an easily accessible introduction.

TOWARDS HOLISTIC AGRICULTURE: A SCIENTIFIC APPROACH.
Another good book acceptable to agricultural colleges by Dick Widdowson.

Useful addresses:
Permaculture Pyrenées
Ass. Las Encantadas, 11300 Bouriege, France. See chapter 'Marc Bonfils.'

H. & W.P.A.
Lyme Cottage,
Lyme lane,
Eardisland, Leominster,
Hereforshire, England

The contact point for progress reports on current trials and the source of some excellent papers on the method.

This booklet would not have been possible without the direct input of Graham Bell and Helen Woodley. Less direct but invaluable assistance came from Andy and Verity Langford, Jake Williams, and a thatcher I met on a rooftop in Branscombe who provided the missing link.

Special thanks to Emilia Hazelip and Marc Bonfils.

Mark Moodie

PERMACULTURE ASSOCIATION

THE Permaculture Association is an educational charity set up to design living communities and to exchange insights and information on the realities of taking ones place in such an arrangement.

For further information try these websites:-

http://www.permaculture.org.uk/pcasite/default.asp
http://primalseeds.nologic.org/naturalfarming.htm
http://www.fukuokafarmingol.net/
http://www.seedballs.com/hazelip.html
http://groups.yahoo.com/group/fukuoka_farming/

CAN WE REGENERATE OUR SOILS AND STILL GROW THE FOOD WE NEED?

Here is the work of Marc Bonfils with winter cereals, his own practical answer to this question. Here is an invitation to you to learn the demands of his method, an invitation to become another. . .

HARMONIOUS WHEATSMITH

ISBN 0-9517890-0-7